Semantic training facilitates the acquisition of novel morphemes : MEG evidence

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SEMANTIC INFORMATION FACILITATES THE ACQUISITION OF NOVEL MORPHEMES: MEG EVIDENCE

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BACKGROUND

- Memory traces for novel monomorphemic words can develop rapidly [1] and independently from attention [2].
- Memory trace formation for novel suffixes benefits from semantic information during learning [3].
- The left fronto-temporal networks play an important role in the processing of morphologically complex words [4]
- However, **neural correlates of online acquisition of novel morphology remain unexplored** [5].

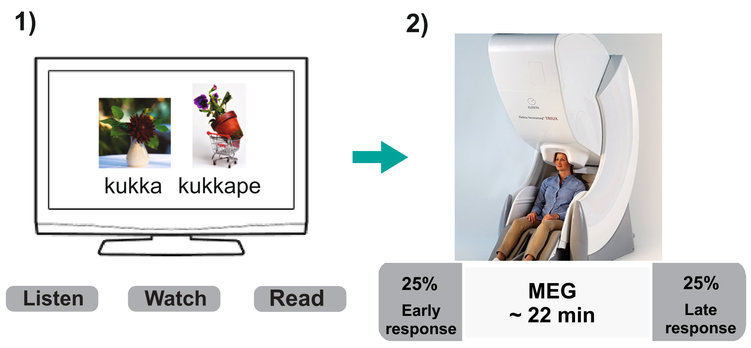
OBJECTIVES

- Do memory traces for novel affixes form during a short perceptual exposure?
- Does providing semantic information yield more efficient aquisition of novel morphology?
- What is the functional role of the inferior frontal, superior and middle temporal brain networks in affix learning?

METHODS

Participants: 19 Finnish native speakers (age: 20-34 yrs.)

Stimuli: 4 real stems and 4 pseudostems paired with 4 novel suffixes (-pe, -tu, -ku, -ti) and real suffixes (-ke, -ko). Two of the novel suffixes were semantically trained (i.e., given meaning) and two were untrained.



Procedure:

1) Semantic training session

2) Task-free MEG recording: auditory passive exposure

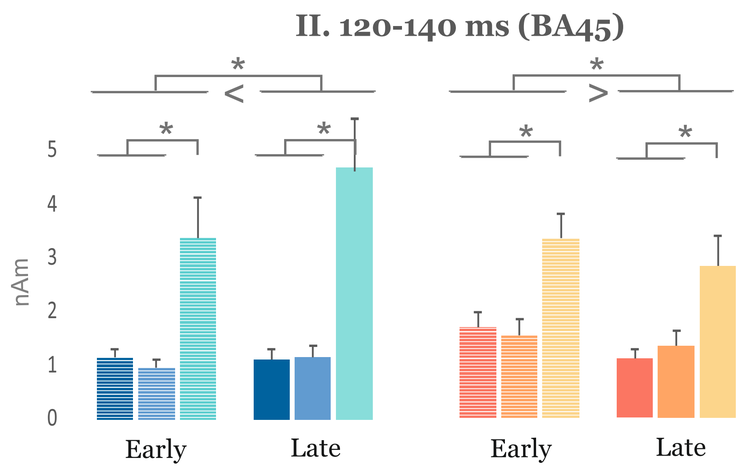
RESULTS

Left Inferior Frontal Gyrus

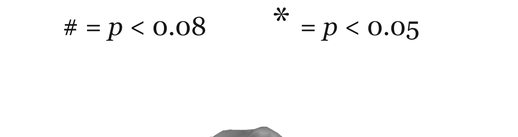
I-III. ***Real suffixes*** elicit ***higher*** activation than novel suffixes

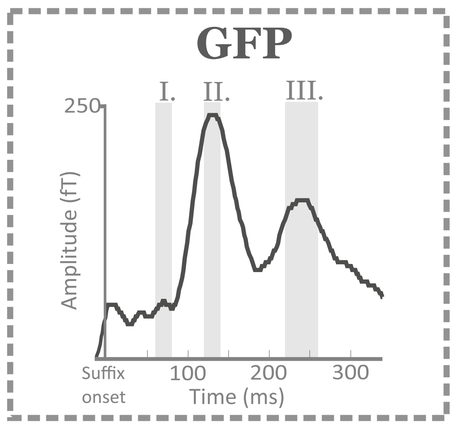
I-III. Activation for suffixes with
- ***real word stems attenuates***
- ***pseudoword stems increases*** over time

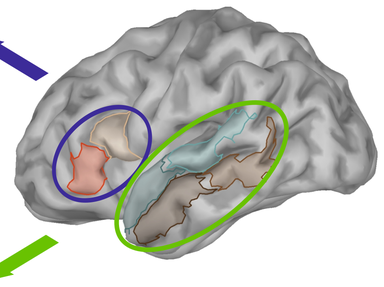
(The same effects are present in all three time-windows and in both BA44 and BA45.)



Suffix: F(2,36) = 18.840, p < 0.001;
Stem lexicality x **Early/Late**: F(1,18) = 9.195, p = 0.007



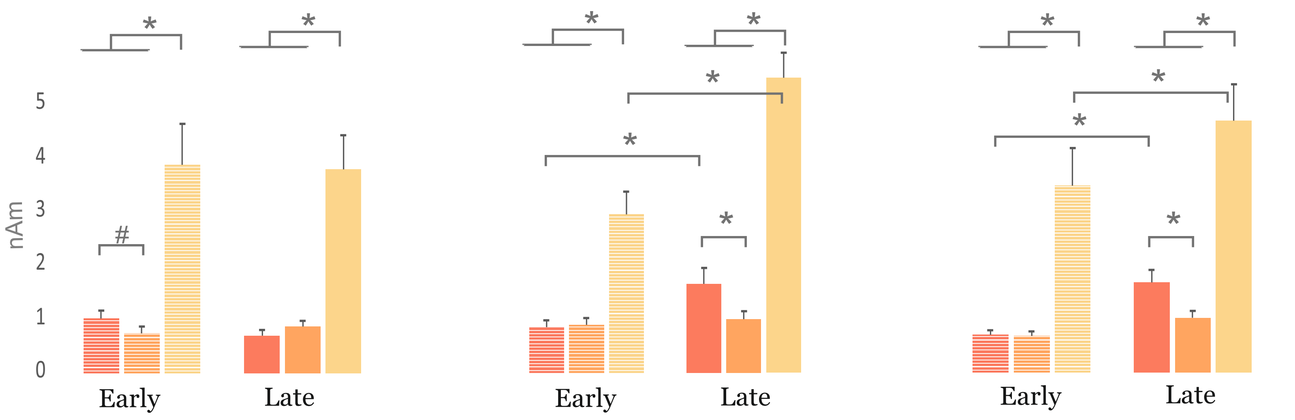




Left Middle Temporal Gyrus

- I-III. ***Real suffixes*** elicit ***higher*** activation than novel suffixes
- I. ***Early*** in exposure, ***trained suffixes*** elicit ***higher*** activation than untrained suffixes in ant. MTG
- II-III. Activation for ***trained and real suffixes increases*** over time in post. MTG

(The effects are most prominent for real word stems, but they are also present in case of pseudoword stems.)



Suffix: F(2,36) = 46.598 p < 0.001;
Suffix x **Early/Late** x **ROI**:
F(6,43.402) =3.693, p = 0.026

Suffix: F(2,36) = 115.603 p < 0.001;
Suffix x **Early/Late** x **ROI**:
F(6,49.702) = 4.142, p = 0.013

Suffix: F(2,36) = 73.786, p < 0.001;
Suffix x **Early/Late** x **ROI**:
F(6,40.070) = 2.839, p = 0.065

CONCLUSIONS

- **Attenuation** over time for **real word stems** (LIFG) → increasing *predictability* of the presented suffix or *repetition suppression*
- **Increasing activation** over time for suffixes with **pseudoword stems** (LIFG) → *application of morphological decomposition*
- **Increasing activation** over time for **trained suffixes** (posterior MTG) → *online memory trace formation*
  → *mapping the newly learned input onto existing lexical representation*
- **Trained vs real suffixes:** *similar activation pattern → a brief perceptual exposure is not sufficient for the full integration into lexical memory, but* **a short explicit semantic training has a facilitative effect**

REFERENCES